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HPV 45 L1 Nucleotide Sequence Alignment

45 L1 wt	(1)	ATGGCTTTGTGGCGGCCTAGTGACAGTACGGTATATCTTCCACCACCTTC
45 L1 R	(1)A.A..ATC....TC...T..C..CT.G.....A..
45 L1 wt	(51)	TGTGGCCAGAGTTGTCAACACTGATGATTATGTGTCTCGCACAAGCATAT
45 L1 R	(51)	...C..T.....C.....C..C..C..C..CA.A..CTC...C.
45 L1 wt	(101)	TTTACCATGCAGGCAGTTCCCGATTATTAAGTGTAGGCAATCCATATTTT
45 L1 R	(101)	.C.....C..T..TTC....A....G..G.....C..T..C.....C..C
45 L1 wt	(151)	AGGGTTGTACCTAGTGGTGCAGGTAATAAACAGGCTGTTCTAAGGTATC
45 L1 R	(151)	..A..C..C..ATCC.....T.....C..G..A.....A.....C..
45 L1 wt	(201)	CGCATATCAGTATAGGGTGTTTAGAGTAGCTTTGCCCGATCCTAATAAAT
45 L1 R	(201)	T..T..C..A..C..A..C..C.....C.....A..C..A..C..G.
45 L1 wt	(251)	TTGGATTACCTGATTCTACTATATATAATCCTGAAACACAACGTTTGGTT
45 L1 R	(251)	.C..T..G..A..C.....C..C..C..A.....T...A.A.....C
45 L1 wt	(301)	TGGGCATGTGTAGGTATGGAAATTGGTCGTGGGCAGCCTTTAGGTATTGG
45 L1 R	(301)C..C.....C...A.A..T..A..A..G.....C..
45 L1 wt	(351)	CCTAAGTGGCCATCCATTTTATAATAAATTGGATGATACAGAAAGTGCTC
45 L1 R	(351)	TT.GTC...T..C.....C..C..C..G.....C..C..C...TCC....
45 L1 wt	(401)	ATGCAGCTACAGCTGTTATTACGCAGGATGTTAGGGATAATGTGTCAGTT
45 L1 R	(401)	.C..T.....T.....C..C..T..A..C..C..A..C..C..C..T..C
45 L1 wt	(451)	GATTATAAGCAAACACAGCTGTGTATTTTAGGTTGTGTACCTGCTATTGG
45 L1 R	(451)	..C..C.....C..AT.....C..G.....C..A.....C..
45 L1 wt	(501)	TGAGCACTGGGCCAAGGGCACACTTTGTAAACCTGCACAATTGCAACCTG
45 L1 R	(501)	...A.....T.....T..CT.G.....G..A..T.....A.
45 L1 wt	(551)	GTGACTGTCCTCCTTTGGAACCTAAAAACACCATTATTGAGGATGGTGAT
45 L1 R	(551)A..A.....T.G..G.....T..C..C..A..C.....C

FIG.1A

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45 L1 wt	(601)	ATGGTGGATACAGGTTATGGGGCAATGGATTTTAGTACATTGCAGGATAC
45 L1 R	(601)T..C..T.....C..T..T.....C..CTCC..CC.....C..
45 L1 wt	(651)	AAAGTGCAGAGGTTCCATTAGACATTTGTCAATCCATCTGTAAATATCCAG
45 L1 R	(651)	T.....T..A.....G.....C.....T.....G..C....
45 L1 wt	(701)	ATTATTTGCAAATGTCTGCTGATCCCTATGGGGATTCTATGTTTTTTTGC
45 L1 R	(701)	.C..C.....C.....C..A..C..T..C.....C..C..T
45 L1 wt	(751)	CTACGCCGTGAACAACCTGTTTGCAAGACATTTTGGGAATAGGGCAGGTGT
45 L1 R	(751)	T.GA.AA.A.....T....C..T.....C..C.....C..A..T.....
45 L1 wt	(801)	TATGGGTGACACAGTACCTACAGACCTATATATTAAGGCACTAGCGCTA
45 L1 R	(801)	C.....T..T..A..T...T.G..C..C..G..T..CTCT....
45 L1 wt	(851)	ATATGCGTGAAACCCCTGGCAGTTGTGTGTATTCCCCTTCTCCCAGTGGC
45 L1 R	(851)	.C...A.A.....T..A..TTCC.....C..C..T..A....ATC...T
45 L1 wt	(901)	TCTATTACTACTTCTGATTCTCAATTATTTAATAAGCCATATTGGTTACA
45 L1 R	(901)C.....C..C.....G..C..C.....C.....G..
45 L1 wt	(951)	TAAGGCCCCAGGGCCATAACAATGGTATTTGTTGGCATAATCAGTTGTTTG
45 L1 R	(951)	C.....T..A..T..C.....C.....C.....C..C..A.....C.
45 L1 wt	(1001)	TTACTGTAGTGGACACTACCCGCAGTACTAATTTAACATTATGTGCCTCT
45 L1 R	(1001)	.C..C..C..T.....A.ATC.....C..G..C..G.....T...
45 L1 wt	(1051)	ACACAAAATCCTGTGCCAAATACATATGATCCTACTAAGTTTAAGCACTA
45 L1 R	(1051)	..T.....C..A..T.....C..T..C..C..A..C.....C.....
45 L1 wt	(1101)	TAGTAGACATGTGGAGGAATATGATTTACAGTTTATTTTTCAGTTGTGCA
45 L1 R	(1101)	CTCC.....C..C.....C..C..G..A..C..C..C..A.....T.
45 L1 wt	(1151)	CTATTACTTTAACTGCAGAGGTTATGTCATATATCCATAGTATGAATAGT
45 L1 R	(1151)C..C..G..C..T..A..C.....C..C..T..CTC.....CTCC
45 L1 wt	(1201)	AGTATATTGGAAAATTGGAATTTTGGTGTACCTCCACCACCTACTACAAG
45 L1 R	(1201)	TC...C.....C.....C..C.....T..A.....A..C..CTC

FIG.1B

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45 L1 wt	(1251)	TTTAGTGGATACATATCGTTTTGTGCAATCAGTTGCTGTTACCTGTCAAA
45 L1 R	(1251)	C..G..T..C..T..CA.A..C..C.....T..C.....C..T.....
45 L1 wt	(1301)	AGGATACTACACCTCCAGAAAAGCAGGATCCATATGATAAATTAAAGTTT
45 L1 R	(1301)C..C..T..A.....A..C.....C..C..G..G.....C
45 L1 wt	(1351)	TGGACTGTTGACCTAAAGGAAAAATTTTCCTCCGATTTGGATCAATATCC
45 L1 R	(1351)T.G.....G..C..T.....C.....C.....C..
45 L1 wt	(1401)	CCTTGGTCGAAAGTTTTTAGTTCAGGCTGGGTTACGTCGTAGGCCTACCA
45 L1 R	(1401)	AT.G...A.....C..G.....A.....T..GA.A.....A..A..T.
45 L1 wt	(1451)	TAGGACCTCGTAAGCGTCCTGCTGCTTCCACGTCTACTGCATCTAGGCCT
45 L1 R	(1451)	.C..T..A.....A.A..A.....T..C.....T.....A..A
45 L1 wt	(1501)	GCCAAACGTGTACGTATACGTAGTAAAAAATAA (SEQ ID NO:3)
45 L1 R	(1501)	..T..G.....CA.A..CA.ATCC..G..G...(SEQ ID NO:1)

FIG.1C

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Synthetic HPV 45 L1 Nucleotide and Amino Acid Sequences

	M	A	L	W	R	P	S	D	S	T	V	Y	L	P	P	P	S
1	ATGGCTTTGT	GGAGACCATC	TGACTCTACT	GTCTACTTGC	CACCACCATC												
	TACCGAAACA	CCTCTGGTAG	ACTGAGATGA	CAGATGAACG	GTGGTGGTAG												
	V	A	R	V	V	N	T	D	D	Y	V	S	R	T	S	I	F
51	TGTCGCTAGA	GTCGTCAACA	CTGACGACTA	CGTCTCCAGA	ACCTCCATCT												
	ACAGCGATCT	CAGCAGTTGT	GACTGCTGAT	GCAGAGGTCT	TGGAGGTAGA												
	Y	H	A	G	S	S	R	L	L	T	V	G	N	P	Y	F	
101	TCTACCACGC	TGGTTCTTCC	AGATTGTTGA	CTGTCCGTAA	CCCATACTTC												
	AGATGGTGCG	ACCAAGAAGG	TCTAACAAC	GACAGCCATT	GGGTATGAAG												
	R	V	V	P	S	G	A	G	N	K	Q	A	V	P	K	V	S
151	AGAGTCGTCC	CATCCGGTGC	TGGTAACAAG	CAAGCTGTTC	CAAAGGTCTC												
	TCTCAGCAGG	GTAGGCCACG	ACCATTGTTC	GTTGACAAG	GTTTCCAGAG												
	A	Y	Q	Y	R	V	F	R	V	A	L	P	D	P	N	K	F
201	TGCTTACCAA	TACAGAGTCT	TCAGAGTCGC	TTTGCCAGAC	CCAAACAAGT												
	ACGAATGGTT	ATGTCTCAGA	AGTCTCAGCG	AAACGGTCTG	GGTTTGTTC												
	G	L	P	D	S	T	I	Y	N	P	E	T	Q	R	L	V	
251	TCGGTTTGCC	AGACTCTACT	ATCTACAACC	CAGAACTCA	AAGATTGGTC												
	AGCCAAACGG	TCTGAGATGA	TAGATGTTGG	GTCTTTGAGT	TTCTAACCAG												
	W	A	C	V	G	M	E	I	G	R	G	Q	P	L	G	I	G
301	TGGGCATGCG	TCGGTATGGA	AATCGGTAGA	GGTCAACCAT	TGGGTATCGG												
	ACCCGTACGC	AGCCATACCT	TAGCCATCT	CCAGTTGGTA	ACCCATAGCC												
	L	S	G	H	P	F	Y	N	K	L	D	D	T	E	S	A	H
351	TTTGTCTGGT	CACCCATTCT	ACAACAAGTT	GGACGACACC	GAATCCGCTC												
	AAACAGACCA	GTGGGTAAGA	TGTTGTTCAA	CCTGCTGTGG	CTTAGGCGAG												
	A	A	T	A	V	I	T	Q	D	V	R	D	N	V	S	V	
401	ACGCTGCTAC	TGCTGTCATC	ACTCAAGACG	TCAGAGACAA	CGTCTCTGTC												
	TGCGACGATG	ACGACAGTAG	TGAGTTCTGC	AGTCTCTGTT	GCAGAGACAG												
	D	Y	K	Q	T	Q	L	C	I	L	G	C	V	P	A	I	G
451	GACTACAAGC	AAACCCAATT	GTGTATCTTG	GGTTGTGTCC	CAGCTATCGG												
	CTGATGTTCG	TTTGGGTAA	CACATAGAAC	CCAACACAGG	GTCGATAGCC												
	E	H	W	A	K	G	T	L	C	K	P	A	Q	L	Q	P	G
501	TGAACACTGG	GCTAAGGGTA	CCTTGTGTAA	GCCAGCTCAA	TTGCAACCAG												
	ACTTGTGACC	CGATTCCCAT	GGAACACATT	CGGTCGAGTT	AACGTTGGTC												

FIG.2A

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D C P P L E L K N T I I E D G D
 551 GTGACTGTCC ACCATTGGAA TTGAAGAACA CTATCATCGA AGACGGTGAC
 CACTGACAGG TGGTAACCTT AACTTCTTGT GATAGTAGCT TCTGCCACTG
 M V D T G Y G A M D F S T L Q D T
 601 ATGGTTGACA CTGGTTACGG TGCTATGGAC TTCTCCACCC TGCAGGACAC
 TACCAACTGT GACCAATGCC ACGATACCTG AAGAGGTGGG ACGTCCTGTG
 K C E V P L D I C Q S I C K Y P D
 651 TAAGTGTGAA GTTCCATTGG ACATCTGTCA ATCTATCTGT AAGTACCCAG
 ATTCACACTT CAAGGTAACC TGTAGACAGT TAGATAGACA TTCATGGGTC
 Y L Q M S A D P Y G D S M F F C
 701 ACTACTTGCA AATGTCCGCT GACCCATACG GTGACTCTAT GTTCTTCTGT
 TGATGAACGT TTACAGGCGA CTGGGTATGC CACTGAGATA CAAGAAGACA
 L R R E Q L F A R H F W N R A G V
 751 TTGAGAAGAG AACAATTGTT CGCTAGACAC TTCTGGAACA GAGCTGGTGT
 AACTCTTCTC TTGTTAACAA GCGATCTGTG AAGACCTTGT CTCGACCACA
 M G D T V P T D L Y I K G T S A N
 801 CATGGGTGAC ACTGTTCCAA CTGACTTGTA CATCAAGGGT ACCTCTGCTA
 GTACCCACTG TGACAAGGTT GACTGAACAT GTAGTTCCCA TGGAGACGAT
 M R E T P G S C V Y S P S P S G
 851 ACATGAGAGA AACTCCAGGT TCCTGTGTCT ACTCTCCATC TCCATCTGGT
 TGTACTCTCT TTGAGGTCCA AGGACACAGA TGAGAGGTAG AGGTAGACCA
 S I T T S D S Q L F N K P Y W L H
 901 TCTATCACTA CTTCCGACTC TCAATTGTTC AACAAGCCAT ACTGGTTGCA
 AGATAGTGAT GAAGGCTGAG AGTTAACAAG TTGTTGCGTA TGACCAACGT
 K A Q G H N N G I C W H N Q L F V
 951 CAAGGCTCAA GGTCACAACA ACGGTATCTG TTGGCACAAC CAATTGTTG
 GTTCCGAGTT CCAGTGTTGT TGCCATAGAC AACCGTGTTG GTTAACAAGC
 T V V D T T R S T N L T L C A S
 1001 TCACCGTCGT TGACACTACC AGATCTACTA ACTTGACCTT GTGTGCTTCT
 AGTGGCAGCA ACTGTGATGG TCTAGATGAT TGAAGTGGAA CACACGAAGA
 T Q N P V P N T Y D P T K F K H Y
 1051 ACTCAAAACC CAGTTCCAAA CACTTACGAC CCAACCAAGT TCAAGCACTA
 TGAGTTTTGG GTCAAGGTTT GTGAATGCTG GGTGGTTCA AGTTCGTGAT
 S R H V E E Y D L Q F I F Q L C T
 1101 CTCCAGACAC GTCGAGGAAT ACGACTTGCA ATTCATCTTC CAATTGTGTA
 GAGGTCTGTG CAGCTCCTTA TGCTGAACGT TAAGTAGAAG GTTAACACAT
 I T L T A E V M S Y I H S M N S
 1151 CTATCACCTT GACCGCTGAA GTCATGTCCT ACATTCACTC TATGAACTCC
 GATAGTGGAA CTGGCGACTT CAGTACAGGA TGTAAGTGAG ATACTTGAGG

FIG.2B

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S I L E N W N F G V P P P P T T S
1201 TCTATCTTGG AAAACTGGAA CTTCGGTGTT CCACCACCAC CAACCACCTC
AGATAGAACC TTTTGACCTT GAAGCCACAA GGTGGTGGTG GTTGGTGGAG
L V D T Y R F V Q S V A V T C Q K
1251 CTTGGTTGAC ACTTACAGAT TCGTCCAATC TGTCGCTGTC ACTTGTCAAA
GAACCAACTG TGAATGTCTA AGCAGGTTAG ACAGCGACAG TGAACAGTTT
D T T P P E K Q D P Y D K L K F
1301 AGGACACCAC TCCACCAGAA AAGCAAGACC CATACGACAA GTTGAAGTTC
TCCTGTGGTG AGGTGGTCTT TTCGTTCTGG GTATGCTGTT CAACTTCAAG
W T V D L K E K F S S D L D Q Y P
1351 TGGACTGTTG ACTTGAAGGA AAAGTTCTCT TCCGACTTGG ACCAATACCC
ACCTGACAAC TGAACCTCCT TTTCAAGAGA AGGCTGAACC TGGTTATGGG
L G R K F L V Q A G L R R R P T I
1401 ATTGGGTAGA AAGTTCTTGG TTCAAGCTGG TTTGAGACGT AGACCAACTA
TAACCCATCT TTCAAGAACC AAGTTCGACC AAACCTCTGCA TCTGGTTGAT
G P R K R P A A S T S T A S R P
1451 TCGGTCCACG TAAGAGACCA GCTGCTTCCA CTTCCACTGC TTCTAGACCA
AGCCAGGTGC ATTCTCTGGT CGACGAAGGT GAAGGTGACG AAGATCTGGT
A K R V R I R S K K * (SEQ ID NO:2)
1501 GCTAAGCGTG TCAGAATCAG ATCCAAGAAG TAA (SEQ ID NO:1)
CGATTGCGAC AGTCTTAGTC TAGGTTCTTC ATT (SEQ ID NO:8)

FIG.2C

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NORTHERN BLOT ANALYSIS OF HPV 45 L1 R.

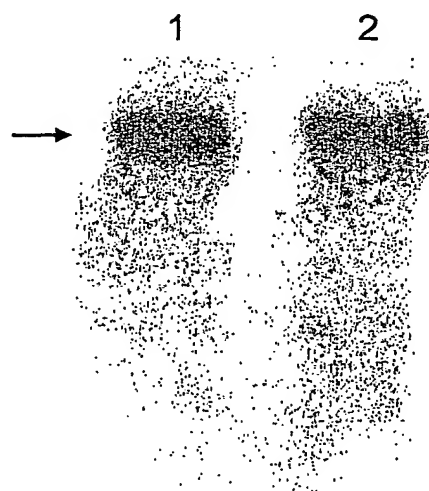


FIG.3

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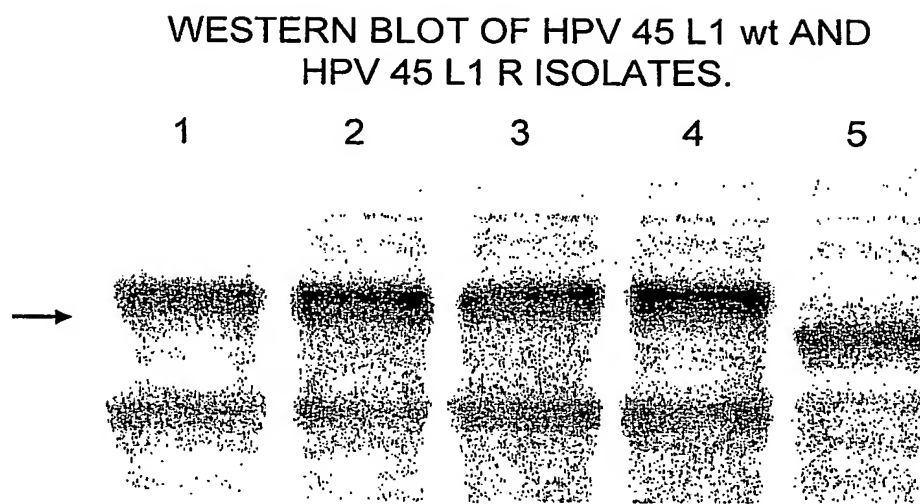


FIG.4

ELISA ASSAY

L1 CONSTRUCT	ng VLP/mcg TOTAL PROTEIN	FOLD INCREASE OVER WILD-TYPE
45 L1 WILD-TYPE	5 ng VLP/mcg TOTAL PROTEIN	na
45 L1 ISOLATE #4	12 ng VLP/mcg TOTAL PROTEIN	2.4
45 L1 R ISOLATE #11	10 ng VLP/mcg TOTAL PROTEIN	2.0

FIG.5

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TRANSMISSION EM OF VLPs COMPOSED OF HPV
45 L1 R PROTEIN MOLECULES.

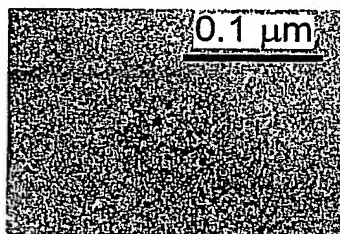


FIG.6